Thymelaceæ.	*Amentiferæ.*
Daphne Laureola, S.	Corylus Avellana, S.
Euphorbiaceæ.	
Euphorbia Peplus, S.	ENDOGENS.
,, Helioscopia, S.	*Liliaceæ.*
Mercurialis perennis, S.	Galanthus nivalis, S.
Urticaceæ.	*Gramineæ.*
Parietaria diffusa, R.	Poa annua, S.
Urtica urens, S.	Triticum repens, R.

In conclusion, my object in presenting these notes to your readers is threefold; first, to suggest an agreeable, easy, and yet useful occupation for winter walks; second, to indicate the value for phenological purposes if a great number of such series of observations could be made for a long series of years at various parts of our country; third, to show how great is the difference, even within the limits of the British Isles,[1] in the time of flowering of common plants, and yet how little we know upon the subject. Should any desire to assist in work of this kind, I would gladly forward free a copy of our printed form, containing lists and suggestions for observations, both of flora and fauna. The work is carried on in connection with the phenological branch of the Meteorological Society, of which the Rev. T. A. Preston, M.A., of Marlboro', is the efficient Secretary.

Bootham, York J. EDMUND CLARK

[1] At Wigton, Cumberland, for instance, although on the West coast, Mr. J. E. Walker noticed only *fourteen* wild flowers.

Colours of Low-growing Wood Flowers

NO one can enter our English woods just now without being struck with the lovely way in which they are starred with the yellow of the primrose, the white of the anemone and strawberry, and the light blue of the dog violet. It will be noticed that the tints of these flowers seem positively to shine in the low herbage and among the semi-shade of the trees and bushes. After twice going through the descriptions of flowers growing in similar situations, given in Hooker's "Student's Flora of the British Islands," I find that nearly all our dwarf wood flowers are white, light yellow, and light blue. None appear to be red. Three are purple—one form of the Sweet Violet and the Ground Ivy (*Nepeta Glechoma*), both of which are scented; and the Bugle (*Ajuga reptans*).

If the white and yellow tints of flowers fertilised by night-moths are of service in guiding the moths to them, may not the like tints in low plants in thickets and woods be similarly advantageous to the plants by tending to secure fertilisation? The more lordly foxglove, the ragged robin, and other higher growing flowers, erect above the low herbage, and enjoying more light, are conspicuous enough, but how would a small flower of the colour of a foxglove attract attention when hid among the grass? The purple of the bugle I cannot account for. The ground ivy has a pungent scent. The purple of the sweet violet is certainly inconspicuous, but here the scent may be the attraction, or the habit of the plant in forming cleistogamous flowers, may secure its multiplication. Hence it may be questioned whether the white form of the sweet violet does not mark a gradual transition towards that colour. If the white forms are more conspicuous, and secure easier cross fertilisation, they may in time preponderate. Perhaps the existence of the sweet violet in the purple and in the white form may throw light on the origin of the general lightness of tint in dwarf wood subjects.

The low flowers in dark places which were lighter and made themselves best seen, would more readily secure fertilisation, and through natural selection would tend to have still paler tints. The change might be aided by the bleaching of flowers in shade, as described by Mr. J. C. Costerus (NATURE, vol. xxv. p. 482). In this connection it may be noted that the wood anemone has a rare purple form—perhaps a survival—and that *Anemone Apennina* is light blue. The Potentillas, close allies of the strawberry, but mainly growing in the open, have as a rule yellow flowers; sometimes red ones. The various mountain primroses of this and other countries, and those that grow in meadows (like our own Bird's Eye Primrose, *primula formosa*), have mostly reddish, lilac, or rosy flowers. The common primrose, when growing in exposed hedgebanks has often reddish, lilac, or purple flowers. Its sports in cultivation are often white, so it may be progressing towards that tint in woods. The cowslip, which grows in meadows, has a deeper tinge of yellow than the ox-lip, which grows in copses. The cowslip is also far darker than the primrose, and sometimes has a scarlet or orange-brown corolla—perhaps the germ of the dark rich polyanthus of our gardens. The primrose family may have originated in woods, and have been originally light, gradually darkening as the flowers multiplied in the open; or, which is more probable, the tribe originated in exposed situations, creeping by slow degrees into the woods, and bleaching as it went.

Bexley, March 30 J. INNES ROGERS

Vignettes from Nature

MR. BUDDEN is perfectly right in querying the locality of the specimens of sharks' teeth which I mentioned as having seen from a South American digging. In consequence of a slight deafness, I misunderstood my friend's account of them; and knowing them to be American, assigned the word "South" to "America," instead of to "Carolina," in the coprolite pits of which they were found. WILLIAM B. CARPENTER

ECONOMIC GEOLOGY OF INDIA[1]

II.

IN a former notice of Prof. Valentine Ball's important work on the "Economic Geology of India," the subjects of the gold supply and of that form of carbon known as the diamond, were treated of. In the present notice it is proposed to give a brief account of that more important form of carbon known as coal, as well as to allude to the valuable information given in the chapters on Iron, Salt, and Building-stone. The rocks, which in Peninsular India probably correspond, as regards the time of their formation, to the true carboniferous rocks of Europe, are not coal-bearing, and the oldest coal-measures in the country belong to a period which is well included within the limits of the Upper Palæozoic or Permian, and the Lower Jurassic formations. All the useful coal of the peninsula may conveniently be described as being of Permio-Triassic age, and, with two exceptions, it may be added, these measures do not occur beyond the limits of the peninsula. In the extra-peninsular area, coal is found in various younger deposits, and there are numerous deposits in Afghanistan, the Punjab, at the foot of the Himalayas, in Assam and Burma, of undoubted Lower Tertiary, Nummulitic, or Eocene coals and lignites; but it is only quite exceptional that such deposits possess any great value (the chief noteworthy exceptions occur in Assam and Burma).

According to the somewhat liberal estimates of Mr. Hughes, the areas in India, in which coal-measures occur, including those unsurveyed, amount in all to 35,000 square miles, but the thickness of a vast number of the seams of coal in these basins is very varied. For over one century the coal-mining industry of India has been in operation, and there has been a steady increase in production and consumption, especially within the last ten years. Still the coal resources of the country cannot be regarded as yet developed. Out of over thirty distinct coal-fields in Peninsular India, only four or five are worked at all, and even of these, but two have arrived at an output of from 1 to 2000 tons a day, and this though in these two fields the coal-pits are numerous.

It is very important that the reasons for this state of things should be well understood, and they are not far to seek. Most of the coal-fields are very remote from the centres of manufacture and from the seaports, and at these places the native produce has to compete with a better quality of coal sea-borne from Europe. With the extension of railways in India, the home coal will have a better chance, as the facilities of carriage will enable the coal to be brought to the iron-mines, which are mostly too at long distances from the ports, and when used in the reduction of metallic ores, the demand for coal would increase.

[1] "A Manual of the Geology of India. Part III. Economic Geology." By V. Ball, M.A., F.G.S., Officiating Deputy Superintendent, Geological Survey of India. Published by order of the Government of India. (Calcutta, 1881.) Continued from p. 510.

As to the quality of the coal of Peninsular India, it is not easy to write in general terms. It may be described as a laminated bituminous coal, in which bright and dull layers alternate; much of it does not coke easily. No true anthracite has as yet been discovered. In the coal from the Raniganj field, the proportion of fixed carbon is under 55 per cent., which is about 10 per cent. under that from the Karharbari field. The amount of moisture varies a good deal in the coal from the different fields, being as high as 14 per cent. in the coal from the Godavari field, and not more than 5 per cent. in that from the Raniganj field. The quantity of sulphur and phosphorus present varies also considerably, but coal, sufficiently free from these impurities as to be available for the manufacture of steel, is to be found. In a table showing the amount of coal imported into, and raised in India, for the years from 1852 to 1880, we find, that of a probable total amount of mineral fuel consumed in India during 1880-81, of 1,500,000 tons, one million was raised in the country, and half a million was imported. While the price of European coal at Indian ports varies, the average value at present per ton is about 30*s*., and English coal has been sold within the last ten years, in Calcutta, for as small a sum as 15*s*. a ton.

At the pit's mouth at the Raniganj field the value of the best coal is about 5*s*. a ton, but the same coal in Madras costs from 30*s*. to 32*s*. a ton, the difference being the cost of transit. On many of the railways in Upper India, wood is largely used as fuel, being much cheaper than coal.

The largest and most important of the areas in which coal is worked in India is that of the Raniganj field. It is situated on the rocky frontier of Western Bengal, at a distance of 120 miles from Calcutta. The available coal was calculated in round numbers by the late Dr. Oldham to be 14,000 millions of tons. Its proximity to the main line of railway, and also to the port of Calcutta, give it an advantage over all other coal areas in India. Coal was known to occur there in 1774, and so long since as 1777 was actually worked. There are now five European companies engaged in the extraction of the coal, besides many smaller firms, and one native company. At one time a good deal of the coal was obtained by open quarrying, now mining is adopted on the pillar and stall plan. None of the mines are of great depth; and there is a perfect freedom from fire and choke-damp. Some of the seams are nearly forty feet in thickness, but as a rule the very thick seams do not contain the best quality of coal. The Lieut.-Governor of Bengal reported for the year 1878-79, that "the year was a prosperous one for the coal companies of Raniganj. There was a large demand, and production was greatly stimulated. The output is estimated to have been 523,097 tons, against 467,924 tons, the average of the three previous years. The number of persons employed was 388,931 men, 194,647 women, and 27,277 children."

The coal-supply of India is a subject of vast interest, one full with a great future for India, and one which though slowly, is steadily coming to be properly understood.

Into the subject of "Peat in India" the space at our disposal does not allow us to enter; and that of "Petroleum" can only be glanced at. So far as is at present known, petroleum has not been met with within the limits of Peninsular India. In the extra-peninsular countries there are several regions where the strata yield more or less abundant supplies of petroleum. The most important of these are in Burma. In British Burma the working of the oil springs is but in its infancy. But in Upper Burma, the exportation of the rock oils is said to have been in progress during the last 2000 years. The oil of Upper Burma, commonly known as Rangoon oil, is a valuable article of export, taking its name from the port from which it is shipped to Europe and America.

In intimate connection with the Coal of India is the abundance in extent of the Iron ores of the same region. In the peninsular area, magnetite occurs in beds or in veins of greater or less extent in most of the regions where metamorphic rocks occur. In some places, as in the Salem district in the Madras Presidency, the development of this ore is on a scale of extraordinary and unparalleled magnitude, whole hills and ranges being formed of the purest forms of it; and in many cases these deposits are not lodes, but beds as truly such as those of gneissose and schistose rocks, with which they are accompanied. To the abundance and wide-spread distribution of these ores in the oldest rocks is no doubt to be attributed the fact of the frequent recurrence of considerable deposits of the general dissemination of ferruginous matter, which more or less characterise the sedimentary rocks of all subsequent periods. In some localities bedded magnetite is known to occur in sub-metamorphic or transition rocks. Thus the rich ores of Central India are principally found as hæmatites in the Bijawar or lower transition series of rocks.

The prevailing red and brown tints characterising the great Vindhyan formation are owing to the presence of iron ores in veins. The Talchir group of the Gondwana system—supposed to have been deposited from floating ice—is notable for the absence in it of iron matter. The next group Barakar is also almost free, but with some remarkable exceptions, as, for example, in the vicinity of the Aurunga coal-field at Palamow. The third group of the system is one of iron-stone shales; while in the succeeding members of the group iron is, though somewhat unequally distributed, always present.

The Laterite of India is peculiarly rich in iron ores, and these have been worked by the native smelters time out of mind. Practical men have sometimes spoken of the native furnaces and methods of working in a very contemptuous manner, or have regarded them as merely objects of curiosity, but ought this to be so? Does not such a work as the famous iron pillar at the Kutab, near Delhi, indicate an amount of skill in the manipulation of a large mass of wrought iron, which has ever been a marvel to all who have studied it. But a few years ago, what iron foundry in Europe could have produced the like, and even now how many are there that would turn out such a mass? Of a total length of 23 feet 8 inches, just 22 feet thereof stands exposed over the ground. Over 16 feet in diameter at the base it tapers to a little over a foot just below its capital, which is $3\frac{1}{2}$ feet high. Its total weight is over six tons. Mr. Ferguson, in his "History of India," believes from the letters on the inscription that it dates from A.D. 400; if so, then it has stood exposed to wind and weather for nearly 1500 years, showing no signs of rust; a most complete testimony to the skill and art of the Indian iron-workers of the period.

Even in quite recent days Indian steel was in considerable demand in England. Its production was the cause of much wonderment, and was accounted for by various theories. The famous Damascus blades had long attained a reputation for pliability, strength, and beauty, ere it was known that the material from which they were made was the product of an obscure Indian village, and it is probably not very generally known that a large quantity of the excellent iron used in the construction of the Menai Suspension and the Britannia Tubular Bridges, was from the Porto Nevo Works in South Arcot in Salem district. The competition with European iron has practically thrown the production of native ore into the deepest shade. Unless, indeed, the Indian iron factories should succeed in producing iron at so low a rate as to defy competition, the import of European iron must continue with the result of leaving no margin for profitable working. In England, too, it will be remembered that the demand for skilled labour has brought forth an abundant supply. In India the loss of a life, or a stoppage of machinery may be productive of serious and prolonged delay, causing numerous embarrassments.

It would seem almost too late for the Government of India itself to undertake the manufacture of iron. Perhaps had it done so, prior to the opening up of its fine system of railways it might have done good, keeping money in the country and employing labour, but there were many and serious objections to such government establishments. In the meanwhile, here and there throughout India iron is still manufactured.

The earthy varieties of the hæmatites, or red and yellow ochres, are abundant in India. They are used by the natives as mineral pigments under the collective term of *girn*, for the adornment of the walls of houses and huts, and sometimes to make the caste marks on the foreheads of the Hindus.

In the Gabalpur district a paint is manufactured by grinding the ore to an impalpable powder by means of grindstones worked by small water-wheels. The powder is packed in bags, and sells retail at a price so high as 13*l*. a ton. It has proved to be the cheapest paint in the Indian market. It lies smoothly on wood or iron, and has been successfully used against damp or porous tiles, bricks, and plaster. It has already stood a good practical test on the metal work of the principal bridges in India.

So far as the coal and iron products of this great dependency of ours are concerned, they would seem more than sufficient for all her needs, but at prices that were alone remunerative when the country remained isolated from the rest of the world. By competition the native production has been almost starved out, but the native consumers get as good an article, and at a far cheaper rate now than of old.

Salt is the mineral product of all others, the most important to the revenue of India, the gross annual receipts from the salt-tax being now about seven millions of pounds sterling. While the native supply is practically inexhaustible, there is still a steady import trade from foreign countries. Within the last ten or twelve years, a great deal has been done in the way of equalising the salt-tax in the different districts of India, and the Government monopoly is now fairly complete. In Madras the indigenous sources of supply have been the salt-pans on the coastal districts, where salt is obtained by the evaporation of sea water. It was also obtained at one time by the lixiviation of saline earth. The salt manufacture begins in January, as soon as the rains are over and the weather begins to get warm. Before the evaporation at the pans begins, there is a preliminary evaporation, lasting over some twenty-five days, in pits, by which the brine is reduced 50 or 75 per cent. in bulk. The manufacture in the pans continues for about twenty-nine days, when the salt is taken out and stored on the banks to dry. The brine is not evaporated to dryness in the pans, in order that the magnesium sulphate may, as much as possible, remain in solution. In Rajputana, there are four sources of salt. The most extensive are the salt lakes, such as Sambhar and Didwana; next come the brine-pits, then some salt is obtained from saline efflorescence from earthwork, and some from deposits in old river-pits. A brine-pit in Bhartpur, examined in 1865, contained 20 to 30 feet of brine at a depth of 20 feet from the surface, and was reported to have shown no diminution of supply during the preceding twenty-eight years.

The Punjab is distinguished from all the other districts of India, in possessing enormous deposits of rock-salt, and it is very remarkable that these deposits do not all belong to the one geological age, but are referable to very distinct periods which are widely separated in time. During the year ending March 31, 1880, inland customs duty was paid on 55,000 tons of salt from the rock-salt mines of the Punjab. The rock-salt of the Kohet district would seem to be of Eocene age; it is overlaid conformably by gypsum, which is again overlaid by rocks of Nummulitic age. Here the salt is obtained by open quarrying. The quarries at Malgin have been worked from time immemorial; those at Bhadur Khel were opened some twelve centuries ago. The total available quantity of salt in these quarries has been estimated to afford a supply, which, allowing a liberal margin for waste, would, at the rate of the present demand, last for 4000 years.

The Salt-range deposit is the oldest-known deposit in the world. It underlies beds containing Silurian deposits, and is therefore of a period at least not younger than the Silurian age. The rock-salt in this range is worked underground. The largest mines of the range are the Mayo mines at Khewra, on the eastern side of the Indus. These and the neighbouring mines had been worked most of all, and generally on a most dangerous system. Thus, in one of the Mayo mines the old Sikh workmen having worked out the salt in one vast chamber, the roof of which which was supported by two immense pillars, commenced and worked out a second chamber under the first one, and beneath the pillar supporting its roof, with the result that on a Sunday, in June, 1870, one of these pillars broke through, carrying with it a large part of the roof, and forming a crater on the hill where the mine is situated. Since then, these mines have been worked in accordance with modern principles, and the appearance of their tunnels, drifts, and tramways is most imposing. There is even a wire-rope tramway to the nearest village from the mouth of the mines. The annual average receipts from the Salt-range Mines is 388,144*l*.

In connection with salt, the subject of Reh is a highly important one. *Reh* is the native term applied to efflorescent salts which have accumulated in the soil or in the subsoil waters of large tracts in India, and this, in some places, to such an extent that cultivation has become impossible, and fertile fields have become barren spaces. The origin of this Reh is now fully understood; the rivers carry in solution saline particles washed out of the rocks over which they flow; as well as a fine silt or alluvium, which also, on its decomposition, yields further salts; in a region of intense evaporation, and where the surface of the ground is constantly irrigated, if there be no free drainage outlet for the waters, the salts contained in them are accumulated in the soil, or still further surcharge the subsoil waters; while over and above all this, during the rainy reason the rain-water, charged with carbonic acid, falling on the porous soil, has the effect of decomposing its mineral constituents and of carrying down to the subsoil the salts then formed. This being the state of things, when the surface of the ground becomes dried, the water, charged with salts, rises up and evaporates, leaving a salt efflorescence, the *reh*, which at length so permeates the superficial layer of soil as to leave it little better than a salt marsh. Contrary to what might on first sight be expected, irrigation by even pure canal water seems to increase the evil; for, as Mr. Medlicott has so well pointed out, the table of salt subsoil water is, by the addition of the canal water, raised to a height that brings it within the reach of evaporation; and so the efflorescence is increased. The only remedies for this state of things would seem to be good, deep subsoil drainage, with thorough washing of the surface soil, and protecting the latter as much as possible from evaporation.

India at one time enjoyed almost a monopoly of the saltpetre trade, and even still, from the port of Calcutta, in the year 1879-80, the export of this commodity was nearly 432,000*l*. The peculiar habits of the people and the fact that in the saltpetre- roducing districts there is a long period of drought after a long period of rain, accounts for the soil in the vicinity of the Indian villages being impregnated with this salt. More than two-thirds of the total quantity of the saltpetre which is exported from Calcutta at present comes from the districts of Tirhut, Saran, and Champaran in Behar.

The Building Stones of India form a wonderfully interesting subject. Among the most abiding records of any

nation must always be included the buildings they have raised, and the duration of these will depend on the material chosen for the erection. Is it a necessity of modern civilisation that our great edifices should be constructed of materials that are quick to perish? and why should it be said of Anglo-Indian architecture, that if the English left India, in a century after their departure no sign of their occupation would remain? and in India, as Prof. Ball remarks, unlike new countries such as Australia and most parts of America, where knowledge had to be obtained by experience, the native temples and buildings should have at once furnished the needed information as to the durability of the material used in them, the only one quality in building material that nothing save time is a test for. Most of the buildings erected by the British in India are built of brick; it need scarcely be added that all the native temples are of stone, and that many exhibit a wonderful mastery over sometimes difficult material. Very strange is it, too, to learn that the resources of India in this respect are so little known or appreciated, that at this day advertisements daily meet the eye in the Indian papers of Aberdeen granites and Italian marbles; and yet how many temples are there to be found in India, constructed of native granites? and what can surpass the white marble filigree screens called jalee, made out of the native marble?

One splendid screen is thus described by Mr. Keene: "But all the marble work of Northern India is surpassed by the monument which Akbar erected over the remains of his friend and spiritual counsellor, Shekh Sulim Chisti, at Fatipur Sikri (1581 A.D.). In the north-western angle of a vast courtyard, 433 feet by 366 feet, is a pavilion externally of white marble, surrounded by a deep, projecting dripstone, also of white marble, supported by marble shafts, crowned by most fantastic brackets, shaped like the letter S. The outer screens are so minutely pierced, that at a little distance they look like lace, and illuminate the mortuary chapel within with a solemn half-light which resembles nothing else that I have seen."

The varieties of metamorphic rocks suited to building purposes in India are very numerous; besides the granites, sandstones and porphyritic gneiss abound. In Mysore, a building-stone occurs in the crystalline rock of the district, which can be split into posts twenty feet long, which have been used for the support of the telegraph wires; and the peculiar adaptability of gneiss to fine carving is often to be seen in the rings appended to the drooping corners of some of the pagodas, where the rings, the links within which are movable, and the projecting corners, are carved out of a single block. Among all the formations, the Great Vindhyan sandstones stand prominent; these were used in the manufacture of stone implements; the great memorial monoliths or lats, many of which bear the edicts of Asoka, the protector of the early Buddhists who reigned about 250 B.C., are made of this stone; some of these are of great size, and on the exposed surfaces are polished; their carved capitals were surmounted with figures of lions or elephants.

There are many quarries of stone throughout India, opened in these Vindhyan rocks. At Dehri, on Son, the stone is a compact white sandstone, strong and durable, and susceptible of artistic treatment. Other fine quarries are at Chunar, from which has come for ages the supply to Benares and Calcutta. But perhaps the most important quarries in India are those in the Upper Bhanrers, which have furnished building material since before the Christian era, to the cities of the adjoining plains. Portions of the Taj at Agra, Akbar's Palace at Fatipur Sikri, the Jamma Masjid at Delhi, have been built from the stone of these quarries. The palace of the Rajah of Bhartpur, at Deeg, one of the most beautiful edifices in India, is constructed of the stone from the same district. In it, cupolas rest on slender shafts of two or three inches in diameter. Arches are supported on strong, yet graceful pillars, and windows are formed of single slabs of stone, perforated with the most elaborate tracery.

Among the sandstones of the Damuda series, there are several varieties which are suited for building purposes. Throughout the Damuda valley, where these rocks occur, they have been used from considerable antiquity for the construction of temples. Among the finest examples known, some Jain temples at Barakar may be mentioned, as they exhibit specimens of wonderful carving which has stood well, though the old Pâli inscriptions on stone of this material in the caves of Sirguja and Chang Bakhar even better testify to the endurance of this rock.

Laterite has also been used as a building material, but it is not ornamental, and does not weather well. Good roofing slate does not appear to exist in India, though in the transition rocks of the Kharakpur Hills, slate occurs; it is a partially altered earthy rock, which is readily fissile, and with pains and care can be reduced to a thickness of one-eighth of an inch; it would answer well for flagging.

Extended though this notice of Prof. Ball's book has been, we have been unable therein to glance at more than its more prominent features. We doubt not, however, that the reader will perceive that it is one of the most important contributions yet made to our knowledge of the economic geology of this vast kingdom, the prosperity of which so nearly and so intimately concerns ourselves.

THE SCIENCE AND ART DEPARTMENT

WE have received the following communication from a correspondent:—

There are few Blue Books that better repay careful study than the admirable reports of the Science and Art Department. The Twenty-eighth Report has recently been issued, and is of exceptional interest. Its bulky appendices contain, as usual, a mass of valuable statistics relating to the diffusion of scientific and artistic instruction among the masses; and in the body of the report we find indications of a general scheme of reorganisation, both in the details and the scope of the higher scientific education given in the Science Schools at South Kensington. This scheme has now taken definite shape, and came into operation with the session which has recently opened. It is therefore a fitting opportunity briefly to review the work done by the Science and Art Department in the scientific instruction of the people, and then examine the nature and object of the changes that are being made at South Kensington.

The Great Exhibition of 1851 revealed the fact, that in order to compete with the industries of foreign nations, it was imperative to have artistic and scientific instruction more widely diffused among the middle and lower classes of this country. To accomplish this the Science and Art Department was formed, and to the soundness of the principles laid down by the Prince Consort and the genius and labour of Sir Henry Cole the success of this Department is largely due. This success is not merely to be found in the large numbers attending the classes in connection with the Department; it is to be seen in the growth of artistic and scientific knowledge among the people, and the application of that knowledge to industrial pursuits. A striking testimony of the change, mainly wrought by the Department, is to be found in the report of the French jurors in the last general Exhibition at Paris. This report states:

"English industry in particular, which, from an artistic point of view, seemed greatly in arrear at the Exhibition of 1851, has during the last ten years made amazing progress; and should it continue to advance at the same rate we might soon be left behind. This state of things